

Mutagenic Evaluation of Compound FDA 71-27 Oil of Garlic 6/30/75

Q 23

LBI PROJECT #2468

MUTAGENIC EVALUATION OF

COMPOUND FDA 71-27

MX8000780

OIL OF GARLIC

SUBMITTED TO

**FOOD & DRUG ADMINISTRATION
DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
ROCKVILLE, MARYLAND**

SUBMITTED BY

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JUNE 30, 1975



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EVALUATION SUMMARY

Compound FDA 71-27, Oil of Garlic, did not exhibit genetic activity in any of the in vitro microbial assays employed in this evaluation.



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DATE: June 30, 1975

SPONSOR: Food and Drug Administration, Contract Number 223-74-2104

SUBJECT: Evaluation of Test Compound MX8000780, Oil of Garlic

I. OBJECTIVE

The objective of this study was to evaluate the test compound for genetic activity in microbial assays with and without the addition of mammalian metabolic activation preparations.

II. MATERIALS

A. Test Compound

1. Date Received: August, 1974
2. Description: Brown aromatic liquid

B. Indicator Microorganisms

The following strains of indicator microorganisms were used in the evaluation:

Yeast Strain: Saccharomyces cerevisiae, strain D4

Bacteria Strains: Salmonella typhimurium, strains: TA-1535
TA-1537
TA-1538

C. Reaction Mixture

The following reaction mixture was employed in the activation tests:

<u>Component</u>	<u>Final Concentration/ml</u>
1. TPN (sodium salt)	6 μ M
2. Isocitric acid	49 μ M
3. Tris buffer, pH 7.4	28 μ M
4. $MgCl_2$	1.7 μ M
5. Tissue homogenate fraction	72 mg



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D. Tissue Homogenates and Supernatants

The tissue homogenates and 9,000 x g supernatants were prepared from tissues of the following mammalian species: Mouse-ICR random bred adult males; rat-Sprague-Dawley adult males; and primate-Macaca mulatta adult males.

E. Positive Control Compounds

Table 1 lists chemicals for positive controls in the direct and activation assays.

TABLE 1
POSITIVE CONTROLS USED IN DIRECT AND ACTIVATION ASSAYS

<u>Assay</u>	<u>Chemical</u> ^a	<u>Solvent</u>	<u>Probable Mutagenic Specificity</u>
Nonactivation	Ethyl methanesulfonate	Water or saline	BPS ^b
	2-Nitrofluorene	Dimethylsulfoxide ^c	FS ^b
	Quinacrine mustard	Water or saline	FS ^b
Activation	Dimethylnitrosamine	Water or saline	BPS ^b
	2-Acetylaminofluorene	Dimethylsulfoxide ^c	FS ^b

- ^a Concentrations given in the Results Section
^b BPS = base-pair substitution; FS = frameshift
^c Previously shown to be non-mutagenic

III. METHODS

A. Toxicity

The solubility, toxicity and doses for all chemicals were determined prior to screening.

Each chemical was tested for survival against the specific indicator strains over a range of doses to determine the 50% survival dose. Bacteria were tested in phosphate buffer, pH 7.4, for one hour at 37°C on a shaker. Yeasts were tested in phosphate buffer, pH 7.4, for four hours at 30°C on a shaker. The 50% survival curve and the 1/4 and 1/2 50% doses calculated.

If no toxicity was obtained for a chemical with a given strain, then a maximum dose of 5% (w/v) was used against the strain.

Unless otherwise specified, the doses calculated for the tests in buffer were applied to the activation tests. The solubility of the test chemical under treatment conditions is stated in the Results Section.



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B. Plate Tests

In the nonactivation procedure, approximately 10^9 cells of a log phase culture of the bacterial indicator strains were spread over the surface of a minimal plate, and a measured amount of the test chemical was placed in the center of the test plate. In activation tests, the test chemical was added to the cells, and an aliquot of the mixture was spread on the surface of the test plate. The reaction mixture (0.1 ml) plus tissue extract was then spotted on the surface of the plate. Positive and solvent controls were included. All plates were incubated at 37°C for four days and then scored. Each compound (Test, Positive Control and Solvent Control) was done in duplicate. Concentrations of the positive control compounds are listed in the Results Section.

C. Suspension Tests

1. Nonactivation

Log-phase bacteria and stationary-phase yeast cultures of the indicator organisms were grown in complete broth, washed and resuspended in 0.9% saline to densities of 1×10^9 cells/ml and 5×10^7 cells/ml, respectively. This constituted the working stock for tests of a group of test chemicals and their respective controls. Tests were conducted in plastic tissue culture plates. Cells plus appropriate volume(s) of the test chemical were added to the wells to give a final volume of 1.5 ml. The solvent replaced the test chemical in the negative controls. Treatment was at 30°C for four hours for yeast tests and at 37°C for one hour for bacterial tests. All flasks were shaken during treatment. Following treatment, the plates were set on ice. Aliquots of cells were removed, diluted in sterile saline (4°C) and plated on the appropriate complete media. Undiluted samples from flasks containing the bacteria were plated on minimal selective medium in reversion experiments. Samples from a 10^{-1} dilution of treated cells were plated on the selected media for enumeration of gene conversion with strain D4. Bacterial plates were scored after incubation for 48 hours at 37°C. The yeast plates were incubated at 30°C for 3-5 days before scoring.

2. Activation

Bacteria and yeast cells were grown and prepared as described in the nonactivation tests. Measured amounts of the test and control chemicals plus 0.25 ml of the stock-cell suspension were added to wells of the Linbro plate containing the appropriate tissue fraction and reaction mixture. All flasks (bacteria and yeast) were incubated at 37°C in an oxygen atmosphere with shaking. The treatment times as well as the dilutions, plating procedures and scoring of the plates were the same as described for nonactivation tests.



D. Preparation of Tissue Homogenates and 9,000 x g Cell Fractions

Male animals (sufficient to provide the necessary quantities of tissues) were killed by cranial blow, decapitated and bled. Organs were immediately dissected from the animal using aseptic techniques and placed in ice-cold 0.25 M sucrose buffered with Tris at pH of 7.4. Upon collection of the desired quantity of organs, they were washed twice with fresh buffered sucrose and completely homogenized with a motor-driven homogenizing unit at 4°C. The whole organ homogenate obtained from this step was divided into two samples. One sample was frozen at -80°C and the other was centrifuged for 20 minutes at 9,000 x g in a refrigerated centrifuge. The supernatant from the centrifuged sample was retained and frozen at -80°C. These two frozen samples were used for the activation studies.

E. Data Recording and Reporting

Following the specified incubation periods all population plates were scored by an automatic colony counter and the results from each plate of a set were recorded, in ink, on data processing forms. All minimal or other types of selective media plates were hand scored and the results recorded along with the respective population data. Other relevant experimental data were recorded on experimental definition forms. For bacteria strains the number of colonies recorded from either the population or selective plates represents that number in 1 ml of test suspension plated. The numbers recorded for the yeast strain D4 represent the number in 0.5 ml of test suspension plated. The data were then processed and printed from a computer program.



IV. RESULTS SECTION

A. Solubility Properties of the Test Compound

1. Name or code designation of the test compound: MX8000780
Oil of Garlic
2. Test solvent: Saline
3. Solubility of the test compound under treatment conditions:
Soluble under treatment conditions.
4. Additional comments: Brown aromatic liquid

B. Toxicity and Dosage Determinations for the Test Compound

1. Test date for toxicity determination: June 6, 1975
2. The 50% survival level was determined for bacteria and yeast indicator organisms by conducting survival curves with the test compound at the following concentrations:

Percent Concentration (w/v or v/v)

10.0
1.0
0.1
0.01
0.001

3. Concentrations of the test compound used in the mutagenicity tests:

<u>Dose</u>	<u>Percent Concentration</u>	
	<u>Bacteria</u>	<u>Yeast</u>
1/4 50% Survival	0.045	0.0825
1/2 50% Survival	0.090	0.1650
50% Survival	0.180	0.3300
Plate Tests	0.090	--



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V. SUMMARY OF TEST RESULTS

Plate Tests

- A. Name or code designation of the test compound: MX8000780
- B. Test date: June 20, 1975
- C. Concentration of the test compound: 0.09%

Test	Species	Tissue	REVERTANTS/PLATE					
			TA-1535		TA-1537		TA-1538	
			1	2	1	2	1	2
1. <u>Non-activation</u>								
Solvent Control	---	---	16	15	3	8	8	3
Positive Control ^a	---	---	>10 ⁴	>10 ⁴	>10 ²	>10 ²	204	243
Test Compound	---	---	13	8	10	2	9	8
2. <u>Activation</u>								
Negative Control	---	---	47	44	0	1	2	1
Solvent Control	---	---	21	28	8	9	7	10
Reaction Mixture Control	---	---	10	8	11	9	17	13
Positive Control ^b	Mouse	Liver	>10 ³	>10 ³	47	46	278	380
Positive Control		Lung	6	6	2	1	4	6
Positive Control		Testes	6	16	5	5	7	8
Positive Control	Rat	Liver	>10 ³	>10 ³	38	47	247	243
Positive Control		Lung	5	8	2	1	6	4
Positive Control		Testes	8	14	3	3	5	8
Positive Control	Monkey	Liver	336	337	34	42	252	256
Positive Control		Lung	4	8	2	2	3	1
Positive Control		Testes	9	15	1	6	4	9
Test Compound	Mouse	Liver	7	4	7	6	3	6
Test Compound		Lung	3	6	5	3	4	6
Test Compound		Testes	8	6	7	7	2	4
Test Compound	Rat	Liver	7	4	6	7	5	3
Test Compound		Lung	2	4	3	4	2	6
Test Compound		Testes	9	6	6	5	4	3
Test Compound	Monkey	Liver	9	5	5	5	5	2
Test Compound		Lung	2	4	4	3	2	4
Test Compound		Testes	7	8	6	5	5	2

a TA-1535 EMS 10 µl/plate
 TA-1537 QM 20 µg/plate
 TA-1538 NF 100 µg/plate

b TA-1535 DMNA 50 µM/plate
 TA-1537 AAF 100 µg/plate
 TA-1538 AAF 100 µg/plate



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DATA TABLE TERMS AND ABBREVIATIONS

ABBREVIATION OR TERM	DEFINITION OR EXPLANATION
COMPOUND	Client designated compound number appears in this column.
TEST CODES	<div> <div>NAN = Nonactivation: Solvent Control</div> <div>NAP = Nonactivation: Positive Control</div> <div>NA1 = Nonactivation: Test Compound Dose 1</div> <div>NA2, etc. = Reflects the other dose level(s)</div> <div>A+C = Negative Chemical Control</div> <div>A-C = Activation: Solvent Control</div> <div>ACP = Activation: Positive Control</div> <div>ACT = Activation: Test Compound</div> <div>A+T = Activation: Tissue Control</div> <div>LI = Liver Tissue Activation Fraction</div> <div>LU = Lung Tissue Activation Fraction</div> <div>KI = Kidney Tissue Activation Fraction</div> <div>TE = Testes Tissue Activation Fraction</div> <div>1,2, etc. = Dose Levels</div> </div>
CONCENTRATION	<p>All test compound dose levels are expressed as a whole number followed by an exponent (negative) identified by the appropriate units.</p> <p>Example: 0025-2PCT = 0.25 percent concentration.</p>
POPU	Total number of viable cells in the plating sample raised to some exponent printed directly below the abbreviation (i.e., EP + 6 = $\times 10^6$).
MUT 1	Total number of mutants or convertants obtained from the sample plated raised to some exponent printed directly below the abbreviation (i.e., EP + 0 = 10^0). For strain D4, MUT 1 represents the number of ADE+ convertants.
MUT 2	Only used for strain D4 and represents the number of TRY+ convertants in the plated sample.
FREQ 1	The calculated mutation or gene conversion frequency times the negative exponent written directly below. For strain D4, FREQ 1 represents the ADE+ value.
FREQ 2	Only used for strain D4 and represents the TRY+ conversion frequency.
CONTAM	Presence of contamination on any plates.



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DATA TABLE TERMS AND ABBREVIATIONS (continued)

ABBREVIATION OR TERM	DEFINITION OR EXPLANATION
AAF	2-Acetylaminofluorene
DMSO	Dimethylsulfoxide
DMN	Dimethylnitrosamine
EMS	Ethyl Methanesulfonate
QM	Quinacrine Mustard
NF	Nitrofluorene
SPECIES	Animal Strains
SPRDAW	Sprague Dawley Rats
ICRFLO	Flow ICR Random Bred Mice
RHESUS	Rhesus Monkey (<u>Macaca mulatta</u>)
MIXEDB	Dog, Mixed Breed
NEWZEA	New Zealand White Rabbit



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LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
REPORT EXR34

COMPOUND FREQUENCY SUMMARY REPORT 07/08/75

SPECIES / COMPOUND MX8000780

TEST	ORG	TA1538 HIS EX-8	TA1537 HIS EX-8	TA1535 HIS EX-8	0000D4 ADE EX-5	0000D4 TRY EX-5
NAN		5.43	2.21	6.43	2.81	2.08
NAP		68.30	118.15	625.95	132.13	78.27
NA1		3.98	3.08	3.94	2.38	1.26
NA2		2.22	4.39	5.54	1.80	2.53



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LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
REPORT EXR34

COMPOUND FREQUENCY SUMMARY REPORT 07/08/75

SPECIES ICRFLO/MOUSE

COMPOUND MX8000780

TEST	ORG	TA1538 HIS EX-8	TA1535 HIS EX-8	TA1537 HIS EX-8	TA1538 HIS EX-8	0000D4 ADE EX-5	0000D4 TRY EX-5
ACT	A+C	7.69	6.24	11.83		2.89	3.14
ACT	A+T	48.48	9.72	7.98		3.01	5.17
ACT	A-C	1.66	3.20	6.13	21.57	2.05	3.45
ACT	PLI	123.74	2697.44	16.60		7.04	11.83
ACT	PLU	6.77	5.04	10.37		5.64	4.14
ACT	PTE	8.54	7.33	9.04		3.80	3.50
ACT	LI1	33.33	16.51	5.23	9.31	2.15	2.15
ACT	LI2	28.57	10.55	5.75	7.52	2.67	1.27
ACT	LU1	7.35	7.85	9.85		3.32	2.30
ACT	LU2	6.25	5.87	9.56		2.25	2.09
ACT	TE1	11.96	9.51	5.62		2.51	3.20
ACT	TE2	7.60	11.59	10.00		2.87	1.77



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LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
REPORT EXR34

COMPOUND FREQUENCY SUMMARY REPORT 07/08/75

SPECIES SPRDAW/RAT

COMPOUND MX8000780

TEST	ORG	TA1535 HIS EX-8	TA1538 HIS EX-8	TA1537 HIS EX-8	0000D4 ADE EX-5	0000D4 TRY EX-5
ACT	A+C	13.67	8.52	4.54	1.97	1.42
ACT	A+T	15.45	5.88	9.11	2.16	2.87
ACT	A-C	15.10	3.73	5.04	0.98	1.63
ACT	PLI	114.52	67.92	8.84	5.65	11.09
ACT	PLU	9.66	5.78	4.87	1.91	2.80
ACT	PTE	13.67	5.02	5.21	3.58	3.29
ACT	LI1	15.75	8.81	5.62	1.15	1.26
ACT	LI2	14.03	6.58	7.72	2.52	2.92
ACT	LU1	10.31	8.33	5.58	1.23	0.92
ACT	LU2	33.65	3.63	4.20	2.52	2.06
ACT	TE1	14.56	6.42	3.16	0.97	1.83
ACT	TE2	10.06	14.86	3.79	2.68	1.66



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LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
REPORT EXR34

COMPOUND FREQUENCY SUMMARY REPORT 07/08/75

SPECIES RHESUS/MONKEY

COMPOUND MX8000780

TEST	ORG	TA1537 HIS EX-8	TA1538 HIS EX-8	TA1535 HIS EX-8	0000D4 ADE EX-5	0000D4 TRY EX-5
ACT	A+C	8.99	10.22	5.80	1.34	1.52
ACT	A+T	11.79	9.38	10.94	2.60	2.50
ACT	A-C	10.58	3.30	5.38	1.12	1.52
ACT	PLI	7.22	102.11	61.95	1.99	5.78
ACT	PLU	9.63	9.36	5.65	4.40	2.03
ACT	PTE	5.52	10.36	6.65	4.48	2.99
ACT	LI1	10.71	6.42	7.61	1.85	2.46
ACT	LI2	8.69	7.04	13.45	2.77	1.88
ACT	LU1	13.99	3.82	4.22	1.88	1.57
ACT	LU2	9.37	5.66	6.41	2.44	1.85
ACT	TE1	8.79	8.23	4.02	2.72	2.83
ACT	TE2	8.91	5.19	6.57	2.90	2.03



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VI. INTERPRETATION OF RESULTS AND CONCLUSIONS

Compound MX8000780, Oil of Garlic, was tested for genetic activity in a series of in vitro microbial assays with and without metabolic activation. The following results were obtained:

A. Salmonella typhimurium

1. Plate tests

At a concentration of 0.09%, MX8000780, was not mutagenic for any of the bacterial indicator strains with or without activation.

2. Nonactivation suspension tests

The results of these tests were negative.

3. Activation suspension tests

The results of these tests were negative. The LI1 and LI2 doses with TA-1538 using mouse tissue were repeated because of increased mutation frequencies. The repeat tests were negative.

B. Saccharomyces cerevisiae

1. Nonactivation suspension tests

The results of these tests were negative.

2. Activation suspension tests

The results of these tests were negative.

C. Conclusions

The test compound, Oil of Garlic, did not exhibit genetic activity in any of the assays employed in this investigation.

Submitted by:



David Brusick, Ph.D.
Director of Genetics



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APPENDIX
Tabulation of Data



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104
EXPERIMENT 516102 DETECTOR TA1535 SPECIES PROJECT 02468
/

DATE - 07/08/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	NAN		SALINE	0856	0055	6.43	0
	NAP		EMS 0.002 %	0682	4269	625.95	0
MX8000780	NA1		0009-2 PCT.	0686	0027	3.94	0
MX8000780	NA2		0045-3 PCT.	0740	0041	5.54	0



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104
EXPERIMENT 516103 DETECTOR TA1537 SPECIES PROJECT 02468
/

DATE - 07/08/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	NAN		SALINE	0272	0006	2.21	0
	NAP		QM 1.0 UG/ML	0303	0358	118.15	0
MX8000780	NA1		0009-2 PCT.	0260	0008	3.08	1
MX8000780	NA2		0045-3 PCT.	0228	0010	4.39	0



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

		CONTRACT 22374-2104		PROJECT 02468			
EXPERIMENT 516104		DETECTOR TA1538		SPECIES /		DATE - 07/08/75	
COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	NAN		DMSO	0184	0010	5.43	1
	NAP		NF 125 UG-ML	0448	0306	68.30	1
MX8000780	NA1		0009-2 PCT.	0176	0007	3.98	1
MX8000780	NA2		0045-3 PCT.	0225	0005	2.22	0



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104		PROJECT 02468							
EXPERIMENT 516105	DETECTOR 0000D4	SPECIES	/	DATE - 07/08/75					
COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+4	MUT1 EP+1	MUT2 EP+1	FREQ1 EP-5	FREQ2 EP-5	CONTAM
	NAN		SALINE	1638	0046	0034	2.81	2.08	0
	NAP		EMS 1.0 %	1192	1575	0933	132.13	78.27	0
MX8000780	NA1		0165-3 PCT.	1426	0034	0018	2.38	1.26	2
MX8000780	NA2		0825-4 PCT.	1779	0032	0045	1.80	2.53	0



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 516702 DETECTOR TA1535 SPECIES ICRFLO/MOUSE

DATE - 07/08/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		DMN 50 UM/ML	0849	0053	6.24	2
	A+T		***NO MATCH***	0391	0038	9.72	0
	A-C		SALINE	0813	0026	3.20	0
	ACP	LI	DMN 50 UM/ML	0273	7364	2697.44	0
	ACP	LU	DMN 50 UM/ML	0674	0034	5.04	0
	ACP	TE	DMN 50 UM/ML	0232	0017	7.33	0
MX8000780	ACT	LI1	0009-2 PCT.	0430	0071	16.51	0
MX8000780	ACT	LI2	0045-3 PCT.	0417	0044	10.55	2
MX8000780	ACT	LU1	0009-2 PCT.	0446	0035	7.85	0
MX8000780	ACT	LU2	0045-3 PCT.	0511	0030	5.87	1
MX8000780	ACT	TE1	0009-2 PCT.	0326	0031	9.51	0
MX8000780	ACT	TE2	0045-3 PCT.	0276	0032	11.59	0



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 517804 DETECTOR TA1537 SPECIES ICRFLO/MOUSE DATE - 07/08/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	0727	0086	11.83	0
	A+T		***NO MATCH***	0489	0039	7.98	3
	A-C		DMSO	0734	0045	6.13	1
	ACP	LI	AAF 800 UG/ML	0940	0156	16.60	2
	ACP	LU	AAF 800 UG/ML	0733	0076	10.37	2
	ACP	TE	AAF 800 UG/ML	0785	0071	9.04	0
MX8000780	ACT	LI1	0009-2 PCT.	0917	0048	5.23	0
MX8000780	ACT	LI2	0045-3 PCT.	0626	0036	5.75	0
MX8000780	ACT	LU1	0009-2 PCT.	0518	0051	9.85	0
MX8000780	ACT	LU2	0045-3 PCT.	0450	0043	9.56	0
MX8000780	ACT	TE1	0009-2 PCT.	0534	0030	5.62	0
MX8000780	ACT	TE2	0045-3 PCT.	0390	0039	10.00	0



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 516101 DETECTOR TA1538 SPECIES ICRFLO/MOUSE

DATE - 07/08/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	0156	0012	7.69	1
	A+T		***NO MATCH***	0132	0064	48.48	2
	A-C		DMSO	0181	0003	1.66	0
	ACP	LI	AAF 800 UG/ML	0198	0245	123.74	3
	ACP	LU	AAF 800 UG/ML	0192	0013	6.77	1
	ACP	TE	AAF 800 UG/ML	0164	0014	8.54	1
MX8000780	ACT	LI1	0009-2 PCT.	0141	0047	33.33	2
MX8000780	ACT	LI2	0045-3 PCT.	0154	0044	28.57	3
MX8000780	ACT	LU1	0009-2 PCT.	0136	0010	7.35	0
MX8000780	ACT	LU2	0045-3 PCT.	0144	0009	6.25	0
MX8000780	ACT	TE1	0009-2 PCT.	0184	0022	11.96	0
MX8000780	ACT	TE2	0045-3 PCT.	0171	0013	7.60	0



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 517506 DETECTOR TA1538 SPECIES ICRFLO/MOUSE

DATE - 07/08/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A-C		DMSO	0343	0074	21.57	0
MX8000780	ACT	LI1	0009-2 PCT.	0204	0019	9.31	0
MX8000780	ACT	LI2	0045-3 PCT.	0226	0017	7.52	0



BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 516903 DETECTOR 0000D4 SPECIES ICRFLO/MOUSE DATE - 07/08/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+4	MUT1 EP+1	MUT2 EP+1	FREQ1 EP-5	FREQ2 EP-5	CONTAM
	A+C		DMN 90 UM/ML	0795	0023	0025	2.89	3.14	2
	A+T		***NO MATCH***	0831	0025	0043	3.01	5.17	1
	A-C		SALINE	0782	0016	0027	2.05	3.45	1
	ACP	LI	DMN 90 UM/ML	0938	0066	0111	7.04	11.83	0
	ACP	LU	DMN 90 UM/ML	0798	0045	0033	5.64	4.14	0
	ACP	TE	DMN 90 UM/ML	0999	0038	0035	3.80	3.50	1
MX8000780	ACT	LI1	0165-3 PCT.	0791	0017	0017	2.15	2.15	5
MX8000780	ACT	LI2	0825-4 PCT.	0711	0019	0009	2.67	1.27	1
MX8000780	ACT	LU1	0165-3 PCT.	0784	0026	0018	3.32	2.30	5
MX8000780	ACT	LU2	0825-4 PCT.	0621	0014	0013	2.25	2.09	2
MX8000780	ACT	TE1	0165-3 PCT.	0718	0018	0023	2.51	3.20	0
MX8000780	ACT	TE2	0825-4 PCT.	0905	0026	0016	2.87	1.77	4



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 516801 DETECTOR TA1535 SPECIES SPRDAW/RAT

DATE - 07/08/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		DMN 50 UM/ML	0907	0124	13.67	2
	A+T		***NO MATCH***	0725	0112	15.45	0
	A-C		SALINE	0881	0133	15.10	2
	ACP	LI	DMN 50 UM/ML	0613	0702	114.52	0
	ACP	LU	DMN 50 UM/ML	1097	0106	9.66	0
	ACP	TE	DMN 50 UM/ML	0929	0127	13.67	0
MX8000780	ACT	LI1	0009-2 PCT.	0692	0109	15.75	0
MX8000780	ACT	LI2	0045-3 PCT.	0727	0102	14.03	0
MX8000780	ACT	LU1	0009-2 PCT.	1086	0112	10.31	0
MX8000780	ACT	LU2	0045-3 PCT.	1037	0349	33.65	0
MX8000780	ACT	TE1	0009-2 PCT.	0742	0108	14.56	0
MX8000780	ACT	TE2	0045-3 PCT.	0855	0086	10.06	0



BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 517006 DETECTOR TA1537 SPECIES SPRDAW/RAT

DATE - 07/08/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	1454	0066	4.54	0
	A+T		***NO MATCH***	0626	0057	9.11	0
	A-C		DMSO	1509	0076	5.04	0
	ACP	LI	AAF 800 UG/ML	0961	0085	8.84	0
	ACP	LU	AAF 800 UG/ML	1521	0074	4.87	2
	ACP	TE	AAF 800 UG/ML	1497	0078	5.21	0
MX8000780	ACT	LI1	0009-2 PCT.	1281	0072	5.62	0
MX8000780	ACT	LI2	0045-3 PCT.	0712	0055	7.72	0
MX8000780	ACT	LU1	0009-2 PCT.	0914	0051	5.58	2
MX8000780	ACT	LU2	0045-3 PCT.	0857	0036	4.20	2
MX8000780	ACT	TE1	0009-2 PCT.	1648	0052	3.16	0
MX8000780	ACT	TE2	0045-3 PCT.	0870	0033	3.79	0



BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 516802 DETECTOR TA1538 SPECIES SPRDAW/RAT DATE - 07/08/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	0223	0019	8.52	0
	A+T		***NO MATCH***	0221	0013	5.88	2
	A-C		DMSO	0241	0009	3.73	0
	ACP	LI	AAF 800 UG/ML	0212	0144	67.92	2
	ACP	LU	AAF 800 UG/ML	0346	0020	5.78	2
	ACP	TE	AAF 800 UG/ML	0319	0016	5.02	0
MX8000780	ACT	LI1	0009-2 PCT.	0329	0029	8.81	0
MX8000780	ACT	LI2	0045-3 PCT.	0319	0021	6.58	0
MX8000780	ACT	LU1	0009-2 PCT.	0348	0029	8.33	1
MX8000780	ACT	LU2	0045-3 PCT.	0303	0011	3.63	1
MX8000780	ACT	TE1	0009-2 PCT.	0296	0019	6.42	0
MX8000780	ACT	TE2	0045-3 PCT.	0175	0026	14.86	0



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 517103 DETECTOR 0000D4 SPECIES SPRDAW/RAT DATE - 07/08/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+4	MUT1 EP+1	MUT2 EP+1	FREQ1 EP-5	FREQ2 EP-5	CONTAM
	A+C		DMN 90 UM/ML	0916	0018	0013	1.97	1.42	0
	A+T		***NO MATCH***	0835	0018	0024	2.16	2.87	1
	A-C		SALINE	0923	0009	0015	0.98	1.63	0
	ACP	LI	DMN 90 UM/ML	0902	0051	0100	5.65	11.09	1
	ACP	LU	DMN 90 UM/ML	0787	0015	0022	1.91	2.80	0
	ACP	TE	DMN 90 UM/ML	1034	0037	0034	3.58	3.29	0
MX8000780	ACT	LI1	0165-3 PCT.	0870	0010	0011	1.15	1.26	0
MX8000780	ACT	LI2	0825-4 PCT.	0753	0019	0022	2.52	2.92	0
MX8000780	ACT	LU1	0165-3 PCT.	0976	0012	0009	1.23	0.92	0
MX8000780	ACT	LU2	0825-4 PCT.	0873	0022	0018	2.52	2.06	0
MX8000780	ACT	TE1	0165-3 PCT.	0927	0009	0017	0.97	1.83	0
MX8000780	ACT	TE2	0825-4 PCT.	0784	0021	0013	2.68	1.66	1



BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 516804 DETECTOR TA1535 SPECIES RHESUS/MONKEY

DATE - 07/08/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		DMN 50 UM/ML	1103	0064	5.80	0
	A+T		***NO MATCH***	0859	0094	10.94	0
	A-C		SALINE	1171	0063	5.38	0
	ACP	LI	DMN 50 UM/ML	0862	0534	61.95	0
	ACP	LU	DMN 50 UM/ML	1116	0063	5.65	0
	ACP	TE	DMN 50 UM/ML	1097	0073	6.65	0
MX8000780	ACT	LI1	0009-2 PCT.	1182	0090	7.61	0
MX8000780	ACT	LI2	0045-3 PCT.	0290	0039	13.45	0
MX8000780	ACT	LU1	0009-2 PCT.	1683	0071	4.22	0
MX8000780	ACT	LU2	0045-3 PCT.	1482	0095	6.41	0
MX8000780	ACT	TE1	0009-2 PCT.	1344	0054	4.02	0
MX8000780	ACT	TE2	0045-3 PCT.	1141	0075	6.57	0



BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 517101 DETECTOR TA1537 SPECIES RHESUS/MONKEY

DATE - 07/08/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	0890	0080	8.99	0
	A+T		***NO MATCH***	0543	0064	11.79	0
	A-C		DMSO	0501	0053	10.58	0
	ACP	LI	AAF 800 UG/ML	0886	0064	7.22	0
	ACP	LU	AAF 800 UG/ML	0748	0072	9.63	0
	ACP	TE	AAF 800 UG/ML	1287	0071	5.52	0
MX8000780	ACT	LI1	0009-2 PCT.	0700	0075	10.71	0
MX8000780	ACT	LI2	0045-3 PCT.	0840	0073	8.69	0
MX8000780	ACT	LU1	0009-2 PCT.	0722	0101	13.99	0
MX8000780	ACT	LU2	0045-3 PCT.	0971	0091	9.37	0
MX8000780	ACT	TE1	0009-2 PCT.	0785	0069	8.79	0
MX8000780	ACT	TE2	0045-3 PCT.	0640	0057	8.91	2



BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 516901 DETECTOR TA1538 SPECIES RHESUS/MONKEY

DATE - 07/08/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	0186	0019	10.22	2
	A+T		***NO MATCH***	0192	0018	9.38	1
	A-C		DMSO	0212	0007	3.30	1
	ACP	LI	AAF 800 UG/ML	0190	0194	102.11	0
	ACP	LU	AAF 800 UG/ML	0235	0022	9.36	1
	ACP	TE	AAF 800 UG/ML	0222	0023	10.36	1
MX8000780	ACT	LI1	0009-2 PCT.	0265	0017	6.42	0
MX8000780	ACT	LI2	0045-3 PCT.	0199	0014	7.04	0
MX8000780	ACT	LU1	0009-2 PCT.	0288	0011	3.82	0
MX8000780	ACT	LU2	0045-3 PCT.	0265	0015	5.66	0
MX8000780	ACT	TE1	0009-2 PCT.	0243	0020	8.23	0
MX8000780	ACT	TE2	0045-3 PCT.	0308	0016	5.19	0



BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

		CONTRACT 22374-2104		PROJECT 02468				DATE - 07/08/75	
EXPERIMENT 517104		DETECTOR 0000D4		SPECIES RHESUS/MONKEY					
COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+4	MUT1 EP+1	MUT2 EP+1	FREQ1 EP-5	FREQ2 EP-5	CONTAM
	A+C		DMN 90 UM/ML	1117	0015	0017	1.34	1.52	0
	A+T		***NO MATCH***	1001	0026	0025	2.60	2.50	4
	A-C		SALINE	0984	0011	0015	1.12	1.52	0
	ACP	LI	DMN 90 UM/ML	1108	0022	0064	1.99	5.78	0
	ACP	LU	DMN 90 UM/ML	0887	0039	0018	4.40	2.03	0
	ACP	TE	DMN 90 UM/ML	1072	0048	0032	4.48	2.99	0
MX8000780	ACT	LI1	0165-3 PCT.	0812	0015	0020	1.85	2.46	0
MX8000780	ACT	LI2	0825-4 PCT.	0903	0025	0017	2.77	1.88	0
MX8000780	ACT	LU1	0165-3 PCT.	0956	0018	0015	1.88	1.57	0
MX8000780	ACT	LU2	0825-4 PCT.	1026	0025	0019	2.44	1.85	0
MX8000780	ACT	TE1	0165-3 PCT.	0918	0025	0026	2.72	2.83	2
MX8000780	ACT	TE2	0825-4 PCT.	1035	0030	0021	2.90	2.03	0